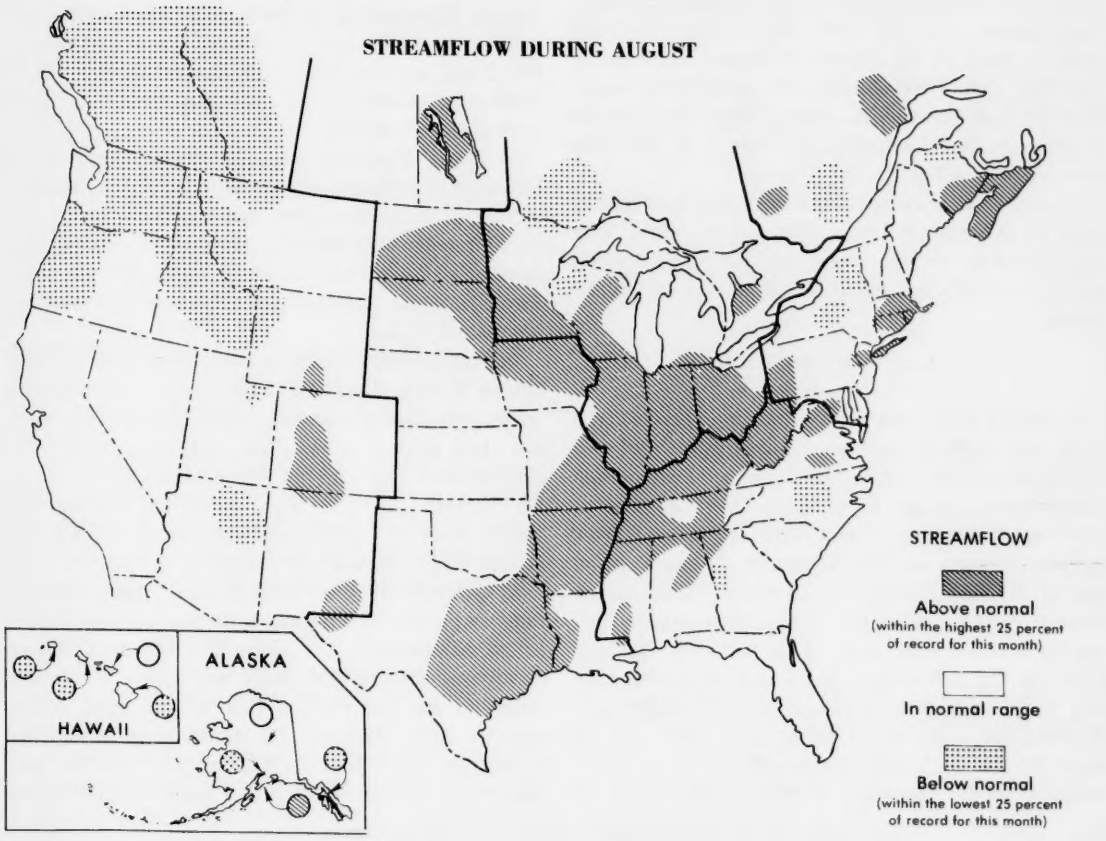
WATER RESOURCES REVIEW for AUGUST 1979

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH



STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow generally decreased seasonally in southern Canada, Maine, Mississippi, New Hampshire, North Carolina, South Carolina, Tennessee, and in most States west of the Mississippi River. Mean flows increased in Arkansas, Nebraska, throughout most of the Ohio River basin, and in southern parts of the Northeast Region. Elsewhere, flows were variable.

Monthly mean flows remained in the above-normal range in parts of each State in and adjacent to Kentucky and Minnesota, and also in parts of Quebec, Alabama, Colorado, Georgia, New Mexico, Texas, and Wyoming. Below-normal streamflow persisted in parts of Arizona, Georgia, Hawaii, New Brunswick, New York, Ontario, and Quebec, and in most States in the Pacific Northwest.

Monthly and daily mean discharges were highest of record for the month in parts of Indiana, Iowa, and Minnesota. Flooding occurred in California, Indiana, Iowa, Minnesota, New York, Ohio, and Virginia.

Ground-water levels continued to decline seasonally in the Northeast Region; levels were generally about average, but above-average locally in southern New England. In the Southeast Region, levels generally rose in Florida; levels declined or showed mixed trends in other States, and were mostly above or below average. Rising and above-average levels prevailed in most of the Western Great Lakes Region. In Michigan, however, levels mostly declined and were above and below average. In the Midcontinent, levels declined in North Dakota, Kansas, and Arkansas, but trends were mixed elsewhere. Levels were above average in Iowa, below average in Arkansas, and mixed with respect to average elsewhere. Mixed trends prevailed in the West, and levels were above and below average.

New high ground-water levels for August were reached in southern California, Illinois, Indiana, Michigan, and Ohio, and new alltime highs occurred in Minnesota and Utah. New low levels for August were recorded in Mississippi, Montana, Nevada, and Texas. New alltime lows were reached in Arkansas, Idaho, and Utah.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

Streamflow decreased seasonally in Maine, New Hampshire and Vermont, increased in Connecticut, Massachusetts, Pennsylvania, and Rhode Island, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Quebec, Massachusetts, and New Jersey, and increased into that range in parts of the Atlantic Provinces, Connecticut, Maryland, New York, Pennsylvania, and Rhode Island. Mean flows remained in the below-normal range in parts of Quebec, New Brunswick, and New York. Flooding occurred in New York.

Ground-water levels continued to decline seasonally in most of the region. Levels near end of month were generally about average except for above-average levels in large parts of Connecticut, Massachusetts, and Rhode Island.

STREAMFLOW CONDITIONS

In eastern New York, severe flooding occurred in a small area north of Jamestown on August 7, when a reported 6 inches of rain fell within a 2-hour period. Considerable damage to property and washouts at numerous bridges and culverts occurred and one fatality was also attributed to that storm. In the south-central part of the State, monthly mean flow of Susquehanna River at Conklin continued to decrease seasonally and was below the normal range for the first time since May 1978. In the Adirondack Mountains of northeastern New York, mean flow of Hudson River at Hadley also decreased seasonally and remained in the below-normal range for the 2d consecutive month. On Long Island, monthly mean discharge of Massapequa Creek at Massapequa increased to over twice the median flow and was above the normal range for the 7th time in the past 8 months.

In northwestern Pennsylvania, mean flow of Allegheny River near Natrona increased sharply to nearly 4 times the median flow and was above the normal range. In the southwestern part of the State, monthly mean flow of Monongahela River at Braddock also increased and was above the normal range at 221 percent of median. Elsewhere in the State, mean flows were above median but within the normal range at index stations on Oil Creek at Rouseville and Susquehanna River at Harrisburg. Contents of principal reservoirs were generally above average.

In central Maryland, streamflow in Seneca Creek at Dawsonville increased, in contrast to the normal seasonal pattern of decreasing flows, and was above the normal range. Elsewhere in the State, mean flow of Choptank River near Greensboro decreased seasonally, was more than 3 times the median flow for August, but was within the normal range.

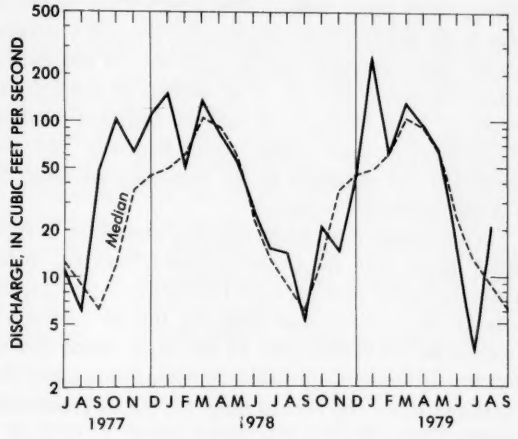
In northern New Jersey, monthly mean flow of South Branch Raritan River near High Bridge increased, contrary to the normal seasonal pattern of decreasing flows was 183 percent of median, and remained in the above-normal range for the 4th consecutive month. In the southern part of the State, mean flow of Great Egg Harbor River at Folsom increased but remained in the normal range and was 116 percent of the median flow

In Connecticut, mean flows increased throughout the State and generally were above the normal range except in the southwestern part where monthly mean flow of Pomperaug River at Southbury was within the normal range. In the northeastern part of the State, where monthly mean discharge of Mount Hope River near Warrenville was below the normal range in June and July, flow increased sharply as a result of runoff from

---

CONTENTS

heavy rains on the 13th and the 26th and was above the normal range at 237 percent of median. (See graph.)



Monthly mean discharge of Mount Hope River near Warrenville, Conn. (Drainage area, 28.6 sq mi; 74.1 sq km)

In Rhode Island, mean flow of Branch River at Forrestdale increased, contrary to the normal seasonal pattern, was 238 percent of median, and was in the above-normal range for the 3d time in the past 4 months.

In central Massachusetts, monthly mean discharge of Ware River at Intake Works near Barre increased and remained in the above-normal range and was 447 percent of median, as a result of high carryover flow from July, augmented by runoff from rains during the last week of August.

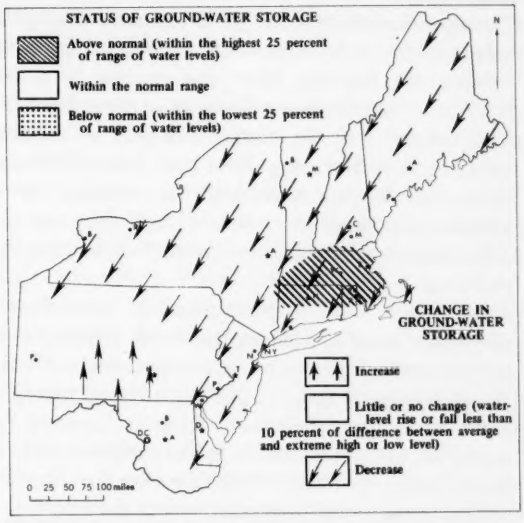
In Maine, Vermont, and New Hampshire, monthly mean flows at index stations decreased seasonally, were near or slightly below median, but within the normal range.

In southern parts of New Brunswick and Nova Scotia, monthly mean flows were unseasonally high, ranging from 4 to 5 times median flows and were well above the normal range, as a result of runoff from frequent and generally heavy rains during the month. In contrast, in northern New Brunswick, monthly mean discharge of Upsalquitch River at Upsalquitch continued to decrease seasonally and remained in the below-normal range for the 3d consecutive month.

In western Quebec, high carryover flow from July held monthly mean discharge of Harricana River at Amos in the above-normal range for the 4th consecutive month. In the eastern part of the Province, mean flow of Outardes River at Outardes Falls increased, contrary to the normal seasonal pattern of decreasing flows, and was above the normal range at 137 percent of median. In the south-central part of the Province, flow of St. Maurice River at Grand Mere continued to decrease seasonally and remained in the below-normal range for the 2d consecutive month. Elsewhere in the Province, mean flows generally decreased seasonally and were in the normal range.

GROUND-WATER CONDITIONS

Ground-water levels continued to decline seasonally in most of the region. (See map.) However, levels rose in a few areas, including south-central Pennsylvania and west-central Maryland. Levels near end of month were generally about average for this time of year. Exceptions included above-average levels in large parts of Connecticut, Massachusetts and Rhode Island and scattered areas in central Pennsylvania.



Map shows ground-water storage near end of August and change in ground-water storage from end of July to end of August.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

Streamflow decreased in Mississippi, North Carolina, South Carolina, and Tennessee, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Alabama, Georgia, Kentucky, Mississippi, Tennessee, Virginia, and West Virginia. Mean flows remained in the below-normal range in parts of Georgia, and decreased into that range in parts of North Carolina. Flooding occurred in Virginia.

Ground-water levels declined and were below average in Mississippi, declined and were above average in

Alabama, and declined but were above and below average in North Carolina. Levels rose generally in Florida and were above and below average. Trends were mixed in other States, as were levels with respect to average. Several new low levels for August were reached in Mississippi.

STREAMFLOW CONDITIONS

Severe flooding occurred near monthend in parts of Rappahannock, Albemarle, and Madison Counties, along the eastern slope of the Blue Ridge Mountains in northern Virginia, as a result of rapid runoff from torrential rains. Two persons were reported drowned near Sperryville, and about 100 persons were reported to have been evacuated from their homes in the village. Damage to roads and bridges in the three-county area was reported to be extensive. Part of this storm runoff entered the Rapidan River and resulted in a sharp increase in monthly mean discharge at the index station near Culpeper. In the southeastern part of the State, mean flow of Nottaway River near Stony Creek continued to decrease seasonally but remained in the above-normal range as a result of high carryover from July, augmented by increased runoff from rains near midmonth.

In eastern West Virginia, monthly mean flow of Greenbrier River at Alderson increased, contrary to the normal seasonal pattern of decreasing flows, and was in the above-normal range. In the southwestern part of the State, mean flow of Kanawha River at Kanawha Falls continued to decrease seasonally but remained above the normal range as a result of high carryover flow from July and increased runoff from rains early in the month.

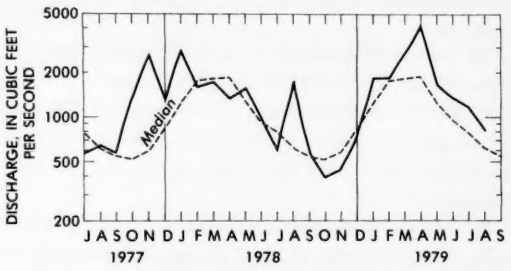
In northern Kentucky, mean flow of Licking River at Catawba also decreased seasonally but remained above the normal range as a result of high carryover flow from July and increased runoff from rains near midmonth, and was 7 times the August median discharge. In the southern part of the State, mean flow of Green River at Munfordville increased, contrary to the normal seasonal pattern, was 3½ times median, and was in the above-normal range.

In the adjacent area of northern Tennessee, monthly mean discharge of Emory River at Oakdale decreased seasonally but remained in the above-normal range for the 5th consecutive month as a result of high carryover flow from July, augmented by increased runoff from rain near midmonth. In west-central Tennessee, mean flow of Buffalo River near Lobelville also decreased seasonally but remained above the normal range for the 5th consecutive month.

Similarly, in northeastern Mississippi, monthly mean flow of Tombigbee River at Columbus also decreased seasonally but remained above the normal range for the 5th consecutive month. In the southeastern part of the State, where mean flow of Pascagoula River at Merrill was in the above-normal range in 6 of the past 8 months, mean flow decreased sharply and was in the normal range but was about 1½ times median. In the adjacent basin of Pearl River, mean flow as measured near the Mississippi-Louisiana border (near Bogalusa, La.) also decreased but remained in the above-normal range for the 8th consecutive month.

In northeastern Alabama, monthly mean flow of Paint Rock River near Woodville increased, contrary to the normal seasonal pattern, was 712 percent of median, and was in the above-normal range for the 3d consecutive month. In the central part of the State, mean flow of Cahaba River at Centreville decreased seasonally but remained above the normal range for the 3d consecutive month.

In northern Georgia, monthly mean discharge of Etowah River at Canton continued to decrease seasonally but remained in the above-normal range for the 6th consecutive month as a result of high carryover flow from July, augmented by increased runoff from rains near monthend. (See graph.) In the central part of the State, monthly mean flow of Flint River near Culloden decreased seasonally and remained in the below-normal range for the 3d consecutive month. Elsewhere in Georgia, mean flows generally were in the normal range and were near, or slightly greater than, median.



Monthly mean discharge of Etowah River at Canton, Ga. (Drainage area, 605 sq mi; 1,570 sq km)

In South Carolina, monthly mean flows decreased, were in the normal range, and generally were near median except in the extreme northeastern part of the State where mean discharge of Pee Dee River at Peedee was only 77 percent of the August median flow.

In the eastern Piedmont of North Carolina, mean flow of Cape Fear River at William O. Huske Lock near Tarheel decreased sharply, was in the below-normal range, and was only 33 percent of median. In the adjacent basin of Neuse River, monthly mean discharge near Clayton also decreased sharply, was below the

normal range, and was 36 percent of the median discharge for August. Eisewhere in the State, mean flows generally were in the normal range.

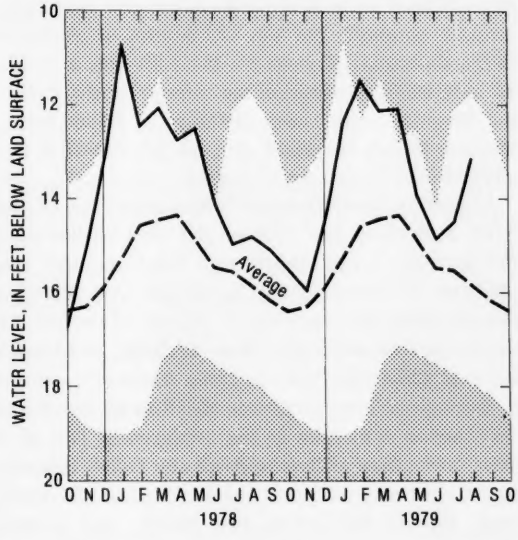
In Florida, monthly mean flows remained in the normal range in all parts of the State, generally increased seasonally in the peninsula but generally decreased in the panhandle. For example, in the west-central part of peninsular Florida, where mean flow of Peace River at Arcadia was below the normal range and only 40 percent of median in July, monthly mean discharge increased seasonally and was in the normal range. And in the northwestern part of the State, mean flows of Apalachicola River at Chattahoochee and Shoal River near Crestview decreased seasonally but remained within the normal range and were slightly greater than median.

GROUND-WATER CONDITIONS

In West Virginia, water levels in the north-central third of the State rose and declined elsewhere. Water-levels were mostly above average.

In Kentucky, levels declined seasonally in the deeper aquifers, but rose in the shallow aquifers in response to heavy rains and high stream stages during the last week of July. The level was highest since records began in 1946 at the key well in the Ohio River valley alluvium near Louisville. The level in this well has been at an alltime record high for 6 of the past 9 months.

In Virginia, the level in the Matoaka Manor well near Petersburg rose for the second consecutive month, in response to above-normal precipitation, and continued above average. (See graph.) The level in the Tyler well in Louisa County declined but was above average, and the level in the Bacon-Summerville well in northern Virginia rose but was below average.



Matoaka Manor well in Colonial Heights, Va., 3 miles north of Petersburg. Drilled unused water-table well in granite; depth, 100 ft.

In western Tennessee, the artesian level in the key well in the "500-foot sand" near Memphis declined slightly, and continued nearly 15 feet below average.

In North Carolina, levels declined statewide, were below average in the Coastal Plain, but were above average in the Piedmont and the mountains.

In Mississippi, levels also declined statewide, and several new low levels for August were reached.

Levels in Alabama declined but were above average in the key wells near Centreville and in Montgomery.

In Georgia, levels in the Piedmont declined; they declined also in the principal artesian aquifer in the Savannah area but rose slightly in the Brunswick area. Levels in the water-table aquifer declined but were above and below average. In the southwest, levels declined 2 to 9 feet.

Ground-water levels rose in parts of northern Florida and in the central peninsula. In Tallahassee, levels declined about a foot. Levels ranged from about 3 feet above average in northern Florida to about 6 feet below average at Jacksonville in the northeast and near Mulberry in west-central Polk County. Levels held fairly steady in southern Florida. They ranged from a foot below average in Broward, Palm Beach, and St. Lucie Counties to 0.3 foot below average in Dade County.

WESTERN GREAT LAKES REGION

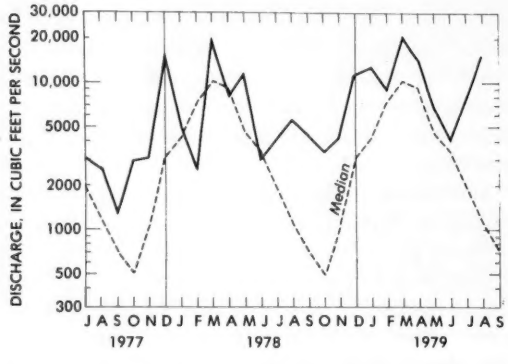
[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

Streamflow generally decreased seasonally in Minnesota and Wisconsin, increased in Indiana and Illinois, and was variable elsewhere in the region. Monthly mean discharges remained in the above-normal range in parts of all States except Michigan, and increased into that range in parts of Ontario. Flows remained in the below-normal range in parts of Ontario, and decreased into that range in parts of Minnesota and Wisconsin. Monthly and daily mean discharges were highest of record for the month in parts of Indiana and Minnesota, and flooding occurred in Indiana, Minnesota, and Ohio.

Ground-water levels rose in all States of the region except in Michigan, where they declined except in the northern part of the Lower Peninsula. Levels were above average in almost the entire region except in part of the Lower Peninsula of Michigan. New high levels for August were reached in Michigan, Illinois, and Ohio, and several new August highs occurred in Indiana. A new alltime high level was recorded in Minnesota.

In extreme southwestern Ohio, a flash flood occurred August 1 on Pleasant Run at Fairfield, a few miles north of Cincinnati, as a result of rapid runoff from intense rainfall. A shopping center, an apartment complex, and approximately 300 homes were reported to have been inundated on the flood plains of Pleasant Run and damage to those properties was estimated to be several million dollars. In the central part of the State, monthly mean flow of Scioto River at Higby increased sharply, contrary to the normal seasonal pattern of decreasing flow, was 814 percent of median, and was above the normal range. Similarly, in the Maumee River basin in northwestern Ohio and the adjacent areas of Michigan and Indiana, mean flow of Maumee River at Waterville, Ohio, increased sharply, contrary to the normal seasonal pattern, was in the above-normal range, and was 827 percent of median. In the northeastern part of the State, monthly mean flow of Little Beaver Creek near East Liverpool continued to decrease seasonally and remained in the normal range.

In Indiana, where severe flooding occurred in central and southern parts of the State in July, rapid runoff from intense thunderstorms during August resulted in flooding in small stream basins in west-central and north-central areas. The greatest 24-hour total rainfall amounts reported by the National Weather Service were 7.43 inches at Covington, on the 19th, 6.46 inches at Spartansburg, on the 28th, and 4.18 inches at Goshen, on the 20th. In south-central Indiana, rain was reported to have fallen almost every day of the month in the basin of East Fork White River and the resulting monthly mean flow of 15,360 cfs, and the daily mean discharge of 31,900 cfs on the 8th, were highest for August at the index station at Shoals (drainage area, 4,927 square miles) in 65 years of record. (See graph.)



Monthly mean discharge of East Fork White River at Shoals, Ind. (Drainage area, 4,927 sq mi; 12,761 sq km)

Similarly, because of high carryover flow from July and the increased runoff from rains during August in the Wabash River basin in western Indiana and the adjacent area of eastern Illinois, the monthly mean discharge of 75,660 cfs, and the daily mean of 139,000 cfs on August 7th, were highest for the month at the index station at Mount Carmel, Ill., (drainage area, 28,635 square miles) since records began at that site in October 1927. In northeastern Indiana, mean flow of Mississinewa River at Marion (tributary to Wabash River) also increased, contrary to the normal seasonal pattern, remained in the above-normal range, and was 12½ times the August median discharge.

In southwestern Minnesota, runoff from intense rainfall resulted in bankfull stages on many of the tributaries in the Blue Earth River basin and in flood stages on Minnesota River at Mankato and at Jordan. At the index station, Minnesota River near Jordan (drainage area, 16,200 square miles), the monthly mean discharge of 12,780 cfs (7 times median), and the daily mean of 17,700 cfs on August 25, 26 were the highest for August since records began in September 1934. At Fairmont, near the Minnesota-Iowa border and in Blue Earth River basin, the National Weather Service reported 8.5 inches of rain on the 21st, runoff from which reportedly caused damage to crops and private property. Mean flow of Mississippi River at St. Paul decreased seasonally but remained in the above-normal range for the 4th time in the past 5 months and was 282 percent of median. In the central part of the State, monthly mean flow of Crow River at Rockford also continued to decrease seasonally but was 373 percent of median and in the above-normal range for the 12th time in the past 14 months. By contrast, in the extreme northern part of the State, monthly mean discharge of Rainy River at Manitou Rapids decreased into the below-normal range and was only 76 percent of median.

In northwestern Wisconsin, where mean flow of Jump River at Sheldon had been greater than median during the previous 7 months (through July), monthly mean discharge decreased sharply in August, into the below-normal range, and was only 59 percent of median. Also in this part of the State, mean discharge of Chippewa River at Chippewa Falls decreased seasonally, remained in the normal range, and was less than median for the first time in 6 months. In the north-central part of the State, mean flow of Oconto River near Gillett continued to decrease seasonally but remained above the normal range for the 6th consecutive month, and remained above median for the 14th consecutive month. In central Wisconsin, monthly mean discharge of Wisconsin River at Muscoda increased, contrary to the normal seasonal pattern, and was above the normal range for the 5th

(Continued on page 8.)

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie, 1.57; Ontario, 1.22.)

Lake	August 31, 1979	Monthly mean, August		August		
		1979	1978	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	*601.43	601.40	601.13	601.00	602.02 (1950)	599.15 (1926)
Michigan and Huron (Harbor Beach, Mich.)	579.96	579.99	578.96	578.64	580.99 (1973)	575.97 (1964)
St. Clair (St. Clair Shores, Mich.)	575.18	575.12	574.47	573.72	576.03 (1973)	571.60 (1934)
Erie (Cleveland, Ohio)	572.08	572.06	571.67	570.73	573.03 (1973)	568.36 (1934)
Ontario (Oswego, N.Y.)	245.14	245.30	245.19	245.13	247.45 (1947)	242.26 (1934)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	August 31, 1979	August 31, 1978	Reference period 1904–78		
			August average, 1904–78	August maximum (year)	August minimum (year)
Elevation in feet above mean sea level:	4,198.15	4,198.70	4,198.10	4,204.10 (1923)	4,191.65 (1963)

LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1977): 102.1 (1869). Alltime low (1939–1977): 92.17 (1941).	August 29, 1979	August 31, 1978	Reference period 1939–78		
			August average, 1939–78	August max. daily (year)	August min. daily (year)
Elevation in feet above mean sea level:	95.21	94.77	95.04	99.31 (1976)	93.39 (1949)

FLORIDA

Site	August 1979		July 1979	August 1978
	Discharge in cfs	Percent of normal	Discharge in cfs	Discharge in cfs
Silver Springs near Ocala (northern Florida)	730	93	750	800
Miami Canal at Miami (southeastern Florida)	210	66	223	375
Tamiami Canal outlets, 40-mile bend to Monroe	250	59	48	452

*Reading on August 29, 1979.

(Continued from page 6.)
time in the past 6 months. In the eastern basin of Fox River, mean flow at Rapide Croche Dam near Wrightstown continued to decrease seasonally, was greater than median, and remained in the normal range.

In southwestern Ontario, monthly mean flow of English River at Umfreville continued to decrease seasonally, was only 64 percent of median, and remained in the below-normal range. In the southeastern part of the Province, east of Lake Huron, mean discharge of Saugeen River near Port Elgin increased, contrary to the normal seasonal pattern, and was above the normal range. Elsewhere in the Province, mean flows decreased seasonally and remained within the normal range.

In Michigan's Lower Peninsula, monthly mean flows of Red Cedar River at East Lansing and Muskegon River at Evart continued to decrease seasonally, remained within the normal range, and were near, or slightly greater than, their respective median flows for August. In the Upper Peninsula, mean discharge of Sturgeon River near Sidnaw increased, contrary to the normal seasonal pattern, but remained within the normal range. Levels of inland lakes in that part of the State were normal.

In central Illinois, mean flow of Sangamon River at Monticello increased, contrary to the normal seasonal pattern, remained in the above-normal range, and was 1,388 percent of the August median discharge, as a result of high carryover flow from July and increased runoff from rainfall early in the month. In the southern part of the State, where mean flow in July was only 21 percent of median, monthly mean discharge increased sharply, as a result of increased runoff from rains early in the month, was 1,866 percent of median, and was in the above-normal range. In northern Illinois, mean flows of Rock River near Joslin and Pecatonica River at Freeport (tributary to Rock River), increased sharply, contrary to the normal seasonal pattern, were 3 times the August median flows at those sites, and were above the normal range.

GROUND-WATER CONDITIONS

Levels in shallow water-table wells in Minnesota rose and were above average. The level in the index well in glacial deposits near Hanska, in Brown County was at an alltime high in 36 years of record on August 10 when the measurement was made. In the Minneapolis-St. Paul area, artesian levels rose in wells tapping the Prairie du Chien-Jordan and the deeper Mt. Simon-Hinckley aquifers, and continued above average.

In Wisconsin, levels generally rose statewide, in response to heavier-than-normal precipitation, and were near or above normal at month's end.

In Michigan, levels continued to decline statewide except for local rises in some wells in the northern part of the Lower Peninsula. Levels were below average in the south-central and southeastern parts of the Lower Peninsula but were above average elsewhere in the State. Despite a slight decline, a new high for August was recorded in 17 years of record in the water-table well in glacial drift at Ishpeming in the western part of the Upper Peninsula.

In Illinois, the level in the shallow well in glacial drift at Princeton, Bureau County, rose more than 5 feet in response to a 5-inch rainfall the day before the month-end measurement; the level reached a new high for August in 36 years of record.

In Indiana, levels continued to rise statewide; several new high levels for August were reached in wells in the southern two-thirds of the State.

In Ohio, levels rose slightly in the northeastern part of the State, and more than 2 feet in central Ohio, where a record high for August was recorded in the key water-table well in Pleistocene gravel near Reese, in Franklin County.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

Streamflow decreased seasonally in Manitoba, Saskatchewan, Kansas, Louisiana, Missouri, North Dakota, and Oklahoma, increased in Arkansas and Nebraska, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Manitoba, Iowa, Louisiana, Missouri, North Dakota, South Dakota, and Texas, and increased into that range in parts of Arkansas. Flooding occurred in Iowa, and monthly mean discharges were highest of record for the month in parts of that State.

Ground-water levels declined in North Dakota, Kansas, and Arkansas; trends were mixed in other States. Levels were above average in Iowa, below average in Arkansas, and above and below average elsewhere. A new high level for August occurred in Iowa, a new low for August was recorded in Texas, and a new alltime low was reached in Arkansas.

STREAMFLOW CONDITIONS

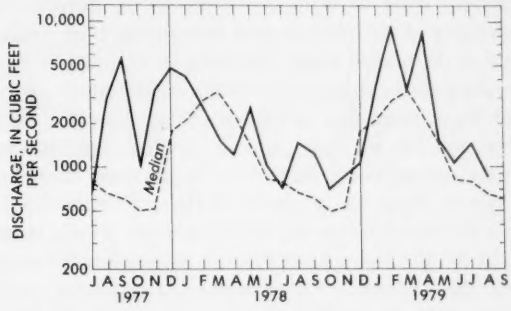
In north-central Iowa, minor flooding occurred early in the month along many small streams as a result of rapid runoff from frequent thunderstorms. In the northwestern part of the State, major flooding occurred August 23 on East Fork Des Moines River at Algona (drainage area, 882 square miles) resulting in a peak discharge of about 11,000 cfs (approximately equal to

that of a 100-year flood), and a peak stage about 1.8 feet higher than the previous maximum stage at that site, observed in April 1965. Downstream, on the mainstem of Des Moines River at Fort Dodge (drainage area, 4,190 square miles) the cumulative runoff from East Fork and other tributaries resulted in a monthly mean discharge of 8,830 cfs, and a daily mean of 22,200 cfs on August 25, both of which were highest for the month in 47 years of record. In eastern Iowa, runoff from frequent storms during the month caused a sharp increase in monthly mean discharge on many streams, including the Cedar River at Cedar Rapids (drainage area, 6,510 square miles) where the monthly mean flow of 12,043 cfs was highest for the month since records began in October 1902. In southwestern Iowa, monthly mean flow of Nishnabotna River above Hamburg decreased seasonally but was 43 percent greater than the August median flow, and remained within the normal range. At monthend, flooding was reported to be in progress along Des Moines River upstream from Stratford, on North Raccoon River near Jefferson, Winnebago River at Mason City, and Shell Rock River at Shell Rock.

In the northwestern part of Missouri, mean flow of Grand River near Gallatin decreased seasonally and remained within the normal range, but was less than the median flow for the month. In southern Missouri, monthly mean discharge of Gasconade River at Jerome decreased seasonally but was 329 percent of median and remained in the above-normal range.

In Arkansas, mean flows increased, contrary to the normal seasonal pattern of decreasing flows, and were above the normal range, in all parts of the State. For example, in northern Arkansas, where mean flow of Buffalo River near St. Joe was only 78 percent of median in July, monthly mean discharge in August was 264 percent of median and in the above-normal range for the 5th time in the past 6 months. In the southern part of the State, monthly mean flow of Saline River near Rye also increased, contrary to the normal seasonal pattern, was 444 percent of median and was above the normal range for the 5th time in the past 6 months.

In the adjacent area of northern Louisiana, monthly mean flow of Saline Bayou near Lucky decreased sharply and was less than median, for the 2d time in the past 3 months, but remained within the normal range. In central and northwestern Louisiana, mean flow of Red River, as measured at Alexandria, was 191 percent of the median for the month, and was in the above-normal range. In the southwestern part of the State, mean flow of Calcasieu River near Oberlin decreased seasonally but remained above the normal range and was 2½ times median. In southeastern Louisiana, mean flow of Amite River near Denham Springs decreased seasonally and was in the normal range but remained above median for the 5th consecutive month. (See graph.) In Pearl River basin, in southeastern Louisiana and the adjacent area of Mississippi, mean flow of Pearl River near Bogalusa, La. decreased seasonally but remained in the above-normal range for the 8th consecutive month. Cumulative runoff at this station for the first 11 months of the 1979 water year was 203 percent of median.



Monthly mean discharge of Amite River near Denham Springs, La. (Drainage area, 1,280 sq mi; 3,315 sq km)

In south-central Texas, monthly mean discharge of Guadalupe River near Spring Branch continued to decrease seasonally but remained in the above-normal range for the 8th consecutive month and for the 12th time in the past 13 months. In the eastern part of the State, mean flow of Neches River near Rockland increased sharply, as a result of increased runoff from rains early in the month, was 1,019 percent of median, and was in the above-normal range for the 4th time in the past 6 months. Also in eastern Texas, mean flow of North Bosque River near Clifton, tributary to Brazos River, also increased, contrary to the normal pattern of decreasing flow, and as a result of increased runoff from rains early in the month, was 729 percent of median, and was in the above-normal range for the first time since May 1977. Mean flows also remained above the normal range in parts of the Colorado and Trinity River basins.

In Oklahoma, streamflow was reported to be greater than median throughout the State. At the index station, Washita River near Durwood, in southwestern Oklahoma, monthly mean discharge continued to decrease seasonally and was 150 percent of the median flow for the month.

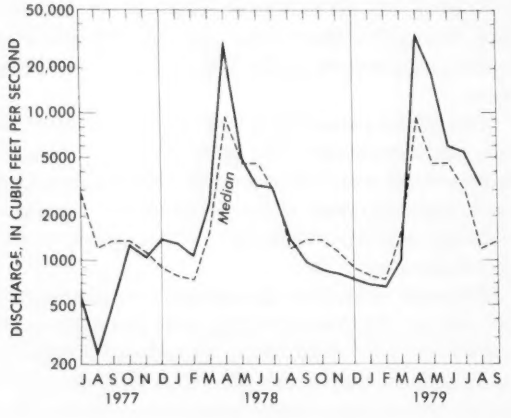
In Kansas, streamflow generally decreased seasonally and was in the normal range. For example, in the northeastern part of the State, mean flow of Little Blue River near Barnes decreased seasonally but was 62 percent greater than median and remained in the normal range for the 6th consecutive month. In southwestern Kansas, monthly mean discharge of Arkansas River at

Arkansas City continued to decrease seasonally, was 42 percent greater than the August median and remained in the normal range for the 5th consecutive month. In the northwestern part of the State, mean flow of Saline River near Russell also decreased seasonally and was in the normal range but was 62 percent less than the median discharge for the month.

In northeastern Nebraska, monthly mean discharge of Elkhorn River at Waterloo increased, contrary to the normal seasonal pattern, and was greater than median and in the normal range, following two months of flow in the below-normal range. In the northwestern part of the State, mean flow of Niobrara River above Box Butte Reservoir also increased, was near median, and remained in the normal range. Mean flows in the lower reaches of Niobrara River, and in the Loup Rivers (North, Middle, and South) were reported to be below the normal range.

In the Big Sioux River basin in eastern South Dakota and the adjacent areas of Minnesota and Iowa, mean flow of Big Sioux River as measured at Akron, Iowa, increased sharply, in contrast to the normal seasonal pattern, was 737 percent of median, and in the above-normal range. Cumulative runoff for the first 11 months of the 1979 water year was 206 percent of the median cumulative runoff for this site. In the central part of the State, mean flow of Bad River near Fort Pierre decreased seasonally but was 192 percent of median and was in the normal range.

In eastern North Dakota, monthly mean flow of Red River of the North at Grand Forks continued to decrease seasonally but remained above median for the 5th consecutive month and was in the above-normal range for the 4th time in the past 5 months. Cumulative runoff at this station for the first 11 months of the 1979 water year was 243 percent of median. (See graph.) In the



Monthly mean discharge of Red River of the North at Grand Forks, N. Dak. (Drainage area, 30,100 sq mi; 78,000 sq km)

southwestern part of the State, mean flow of Cannonball River at Breien decreased sharply but remained in the above-normal range, and was 212 percent of median, as a result of high carryover flow from July, augmented by runoff from rains late in the month. Cumulative runoff at this station for the first 11 months of the 1979 water year was 196 percent of median.

In southeastern Saskatchewan, monthly mean flow of Qu'Appelle River near Lumsden decreased sharply from the high flow of July and was only 41 percent of median but was within the normal range.

In southern Manitoba, mean discharge of Waterhen River below Waterhen Lake decreased seasonally but remained in the above-normal range for the 3d consecutive month. The level of Lake Winnipeg at Gimli averaged 714.72 feet above mean sea level for the month, 0.65 foot lower than last month, 0.79 foot higher than last August, and 0.59 foot higher than the long-term mean for August. Records of Lake Winnipeg levels were started in May 1913 at Winnipeg Beach.

GROUND-WATER CONDITIONS

In North Dakota, levels declined slightly, but continued near normal.

Levels in Nebraska declined statewide and were about average at month's end.

In Iowa, levels in shallow water-table wells generally declined in the southern part of the State but rose in the north. Levels were generally above average; a new high level for August was recorded in the shallow well in glacial drift at Marion, in Linn County, in 38 years of record.

In Kansas, levels declined statewide and were below average except in northeastern Kansas, where they were nearly a foot above average.

In east-central Arkansas, the level in the key well in the shallow Quaternary aquifer declined slightly and was nearly 5 feet below average. The artesian level in the well in the deep Sparta Sand aquifer declined more than 5 feet and was about 22 feet below average. In the industrial aquifer of central and south Arkansas (also the Sparta Sand), levels declined and continued below average; the level in the well at Pine Bluff, in Jefferson County, reached a new alltime low in 21 years of record.

In Louisiana, levels rose in irrigation wells in the Chicot aquifer of the southwest; levels in the Lake Charles industrial area held steady. In the New Orleans area, levels declined in wells in all aquifers. Levels in the "400-foot sand" and in the "600-foot sand" of the Baton Rouge area continued their seasonal decline. Levels in the "1,200-foot sand" rose 2 to 5 feet. However, levels in the "2,000-foot sand" of the Baton Rouge area declined 4 to 11 feet. Levels in most wells in

the Florida Parishes declined seasonally. A continuing regional decline has persisted in wells of the Miocene and Sparta Sand aquifers in the northern part of the State, caused by pumping for industrial and municipal use; levels in several key wells were at or near alltime lows. Levels in the alluvial and upland terrace aquifers reflected normal seasonal declines.

In Texas, levels in key wells in the Edwards aquifer rose and were above average at Austin, and declined but were above average at San Antonio. Levels rose but were below average in the Evangeline aquifer at Houston and in the bolson deposits at El Paso. Despite the slight rise in the key well at El Paso, the level was at a new low for August in 21 years of record.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

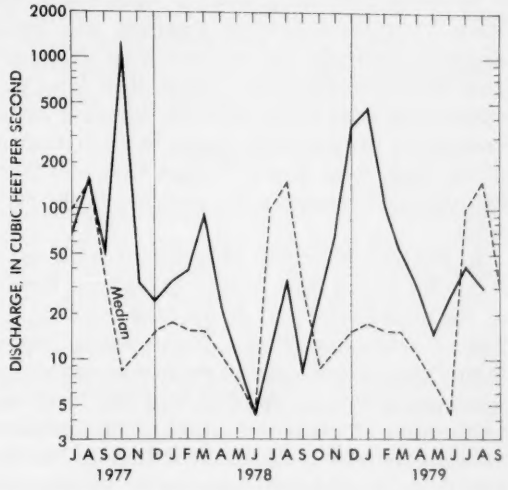
Streamflow generally decreased seasonally in most of the region but was variable in Arizona and New Mexico. Monthly mean flows remained in the above-normal range in parts of California, Colorado, New Mexico, and Wyoming. Below-normal streamflow persisted in parts of Arizona, Idaho, Montana, Oregon, and Washington, and decreased into that range in parts of Alberta, British Columbia, and Utah. Flooding occurred in California.

Ground-water levels showed mixed trends in the region, and levels were above and below average. A new August high level was recorded in southern California, and new August lows occurred in Montana and Nevada. An alltime high and an alltime low were reached in Utah, and two new alltime low levels occurred in Idaho.

STREAMFLOW CONDITIONS

In California, monthly mean flows at all index stations continued to decrease seasonally and remained in the normal range. In desert areas of southern California, runoff from heavy rainfall on August 17, 18 caused street and local flooding in the communities of Barstow, Blythe, and Palm Springs. This same general area was severely damaged by a tropical storm less than a month ago. Combined contents of 10 reservoirs in northern California were 101 percent of average and 88 percent of the contents one year ago.

In north-central Arizona, where there was no flow during July at Little Colorado River near Cameron, streamflow increased but remained in the below-normal range and was only 21 percent of median. In the San Pedro River basin in southern Arizona, monthly mean discharge as measured at Charleston decreased, in contrast to the normal seasonal pattern of increasing flows, but remained in the below-normal range for the 2d consecutive month. (See graph.) Elsewhere in the State, mean flows at index stations generally increased seasonally, were near or slightly below median, but within the normal range.



Monthly mean discharge at San Pedro River at Charleston, Ariz. (Drainage area, 1,219 sq mi; 3,157 sq km)

In Utah, streamflow decreased seasonally and was within the normal range and near median throughout the State, except for the northeastern part where mean flow of Whiterocks River near Whiterocks decreased into the below-normal range.

Contents of the Colorado River Storage Project decreased 635,200 acre-feet during the month.

In Nevada, monthly mean flow of Humboldt River at Palisade continued to decrease seasonally and remained in the normal range for the 3d consecutive month.

In southeastern New Mexico, streamflow increased sharply to nearly 8 times median and was above the normal range at the index station, Delaware River near Red Bluff. In the northern part of the State, high carryover flow held monthly mean discharge of Rio Grande below Taos Junction Bridge, near Taos in the above-normal range for the 6th consecutive month. Cumulative runoff at both sites for the first 11 months of the 1979 water year was 230 percent of median. Mean flows at the remaining index stations located on the Pecos and Gila Rivers were above median but within the normal range.

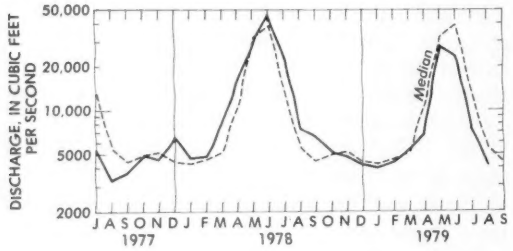
West of the Continental Divide in southwestern Colorado, monthly mean flow of Animas River at Durango continued to decrease seasonally but because of high carryover flow, remained in the above-normal range for the 6th consecutive month. In the west-central part

of the State, mean flow of Roaring Fork River at Glenwood Springs also decreased seasonally and remained in the above-normal range for the 3d consecutive month. Elsewhere in the State, monthly mean flows were generally above median but within the normal range.

In southern Wyoming, monthly mean flow of North Platte River above Seminoe Reservoir, near Sinclair, decreased seasonally but remained in the above-normal range for the 3d consecutive month. Mean flows at this station have been greater than the respective monthly medians for 10 consecutive months. In the northern part of the State, mean flow of Tongue River near Dayton also decreased seasonally but remained in the normal range.

In Montana, streamflow decreased seasonally and was within the normal range for most of the State. However, in the southwestern part of the State, monthly mean flow of Yellowstone River at Corwin Springs remained in the below-normal range for the 2d consecutive month as a result of low carryover flow from July. Similarly, in northwestern Montana, west of the Continental Divide, low carryover flow in Clark Fork at St. Regis held mean flow in the below-normal range for the 3d consecutive month. Also in northwestern Montana but east of the Divide, mean flow of Marias River near Shelby decreased sharply and was below the normal range for the first time since February 1979.

In Idaho, all unregulated streamflow was in the below-normal range. Monthly mean discharges of Snake River near Heise and Clearwater River at Spalding remained in the below-normal range for the 2d consecutive month. In the west-central part of the State, monthly mean flow of Salmon River at White Bird continued to decrease seasonally, was only 77 percent of median, and remained in the below-normal range for the 3d consecutive month. (See graph.) Storage for irrigation in southern Idaho continued below average for the 3d consecutive month.



Monthly mean discharge of Salmon River at White Bird, Idaho
(Drainage area, 13,550 sq mi; 35,090 sq km)

In southwestern Alberta, monthly mean flow of Bow River at Banff continued to decrease seasonally and was below the normal range for the 5th time in the past 6 months. Also in western Alberta, monthly mean discharge of Athabasca River at Hinton was below the normal range and remained below median for the 5th consecutive month.

In southern British Columbia, mean flow of Fraser River at Hope decreased seasonally and was below the normal range for the first time since April 1979. In the northern part of the Province, monthly mean discharge of Skeena River at Usk also decreased seasonally but remained in the normal range for the 7th consecutive month.

In Washington, streamflow was below the normal range at all five of the reporting stations in the eastern part of the State. For example, monthly mean flow of Spokane River at Spokane was only ½ the median flow and remained in the below-normal range for the 3d consecutive month. On the northwest slope of the Cascade range, monthly mean flow of Skykomish River near Gold Bar decreased to 71 percent of median and into the below-normal range.

In Oregon, streamflow was within the normal range in the John Day River basin and in the below-normal range elsewhere in the State. Monthly mean flows at index stations on the Columbia, Umpqua, and Willamette Rivers remained in the below-normal range for the 3d consecutive month and averaged about 75 percent of median.

GROUND-WATER CONDTIONS

In Washington, the level in the observation well in Spokane, in the eastern part of the State, declined nearly 2 feet and was a foot below average.

In Idaho, the level in the key well in the Boise Valley rose and was nearly 2 feet above average. Levels rose but were below average in wells in the western Snake River Plain aquifer at Gooding and Eden. Levels in the central and eastern parts of this aquifer, at Rupert and Atomic City, declined to new alltime low levels in 29 and 30 years of record, respectively.

In Montana, the level in the water-table well in Quaternary alluvium at Hamilton Fairgrounds rose and was about average. The level in the shallow well in terrace gravel at Missoula declined nearly a foot, was more than 2 feet below average, and reached a new low for August in 19 years of record.

In southern California, levels declined and were below average in the key wells in Los Angeles and Orange Counties. In Santa Barbara County, the levels in the observation wells in Santa Ynez and Santa Maria Valleys rose and were above average. Despite a decline of nearly 4 feet, the level in the well at Cuyama in Upper Cuyama Valley was at a new August high near month's end in 29

years of record; this is the third consecutive month-end high at this well.

In Nevada, the level in the key well in Las Vegas Valley rose but was nevertheless at a new low for August in 33 years of record. The levels in the wells in Paradise Valley and Steptoe Valley declined but were above average; the level in the Truckee Meadows well rose but was below average.

In Utah, levels declined and were below average in the Flowell, Holladay, and Logan areas; the level in the key well in the Holladay area reached a new alltime low in 31 years of record. Levels rose and were above average in the Blanding area, where a new alltime high was reached in the key well for the second consecutive month in 19 years of record.

In Arizona, the levels in the City of Tucson No. 2 well declined and continued more than 21 feet below average; levels declined in a second key well and rose in two others.

In New Mexico, the artesian level in the Berrendo-Smith observation well rose nearly a foot and was 2/3 foot above average. Levels in the Hrna, Lovington, and Dayton water-table wells declined seasonally and continued below average.

ALASKA

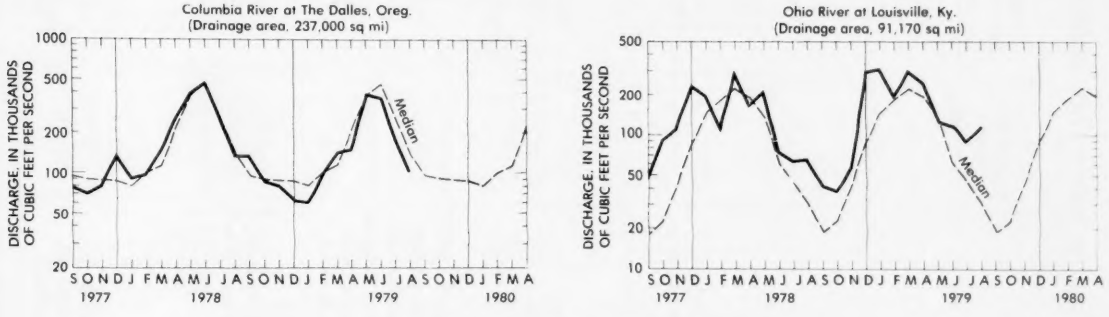
Streamflow generally decreased seasonally except in the south-central coastal basin of Kenai River, and in the interior basin of Chena River. Monthly mean flow of Kenai River at Cooper Landing increased as a result of warm temperatures causing melt at the glaciers in the basin and rain at higher altitudes. In the south-central basin of Little Susitna River and the southeast-coastal basin of Gold Creek, mean flows continued to decrease seasonally at the respective index stations near Palmer and at Juneau, were slightly more than ½ the August median flows, and were below the normal range.

Ground-water levels in wells tapping the confined aquifer system in the Anchorage area continued to rise, with few exceptions, with most levels ranging from 0.5 to 1.5 feet above last month. The shallow water table was slightly higher in monitored areas.

HAWAII

Streamflow decreased, contrary to the normal seasonal pattern of increasing flow, at the index stations on the islands of Hawaii and Kauai. Monthly mean discharge of Waiakea Stream near Mountain View, Island of Hawaii, decreased sharply, was only 47 percent of median, and was in the below-normal range. Mean flow of East Branch of North Fork Wailua River near Lihue, Island of Kauai, also decreased instead of increasing seasonally, and remained in the below-normal range. On the islands of Oahu and Maui, mean flows at the index stations, Kalihi Stream near Honolulu and Honopou Stream near Huelo, respectively, decreased seasonally and were below the median flows for August. The mean flow of Kalihi Stream was only 28 percent of median and remained in the below-normal range for the 2d consecutive month. On Guam, Mariana Islands, monthly mean discharge of Ylig River near Yona increased seasonally and was in the normal range at 70 percent of median.

HYDROGRAPHS OF TWO LARGE RIVERS



METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 meter 1 mile = 1.609 kilometers
1 acre = 0.4047 hectare = 4,047 square meters
1 square mile (sq mi) = 259 hectares = 2.59 square kilometers (sq km)
1 acre-foot (ac-ft) = 1,233 cubic meters
1 million cubic feet (mcf) = 28,320 cubic meters
1 cubic foot per second (cfs) = 0.02832 cubic meters per second = 1.699 cubic meters per minute
1 second-foot-day (cfsd) = 2,447 cubic meters
1 million gallons (mg) = 3,785 cubic meters = 3.785 million liters
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2,629 cubic meters per minute = 3.785 cubic meters per day

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR AUGUST AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	August data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at	*1979	4,510	.....	.....	.....	.....	.....	.....	.....	.....
	Trenton, N.J.	1945–78	6,387	67	158	.....	505	21,500	.....	17.5	31.5
	(Morrisville, Pa.)	(Extreme yr)		(1945)	(1967)		(1965)	(1955)			
			[c]4,268								
04264331	St. Lawrence River at	1979	274,500	165	167	123,000	122,000	124,000	21.5	20.0	23.5
	Cornwall, Ontario, near	1976–78	288,000	166	170	129,000	113,000	153,000	21.5	19.0	23.0
	Massena, N.Y.	(Extreme yr)		(1976–78)	(1978)		(1977)	(1976)			
	median streamflow at Ogdensburg, N.Y.		[c]252,000								
	SOUTHEAST										
07289000	Mississippi River at	1979	585,300	207	241	349,000	251,000	442,000	29.0	27.5	30.0
	Vicksburg, Miss.	1976–78	328,700	213	290	222,000	118,000	345,000	30.0	27.5	34.0
		(Extreme yr)		(1977)	(1978)		(1977)	(1978)			
			[c]317,600								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	1979	291,000	159	250	.....	58,300	211,000	.....	24.5	26.0
	53, near Grand Chain, Ill.	1955–78	131,200	128	339	.....	20,300	246,000	.....	17.0	30.5
	(25 miles west of Paducah,	(Extreme yr)		(1963)	(1977)		(1965)	(1958)			
	Ky.; streamflow station		[c]102,200								
	at Metropolis, Ill.)										
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1979	70,200	272	535	83,400	73,100	104,000	26.5	25.0	30.0
	Mo. (60 miles west of St.	1976–78	61,510	295	436	62,900	43,000	96,200	26.5	25.0	29.5
	Louis, Mo.)	(Extreme yr)		(1977)	(1977)		(1977)	(1978)			
			[c]55,620								
	WEST										
14128910	Columbia River at	1979	108,100	85	89	25,400	15,100	30,800	21.0	20.5	21.5
	Warrendale, Oreg.	1976–78	148,500	71	100	33,600	14,200	52,500	20.5	18.5	22.0
	(streamflow station	(Extreme yr)		(1976)	(1977)		(1978)	(1976)			
	at The Dalles, Oreg.)		[c]153,200								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: |(1.8 X °C) + 32| = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.
*Dissolved-solids and water-temperature records not available.

Provisional data; subject to revision

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF AUGUST 1979

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of July 1979	End of Aug. 1979	End of Aug. 1978	Average for end of Aug.	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	82	74	47	48	226,300 (a)
QUEBEC					
Allard (P)	80	76	72	67	280,600 ac-ft
Gouin (P)	72	70	69	65	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	78	70	73	67	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	87	83	84	84	3,330 mcf
Lake Francis (FPR)	81	75	73	82	4,326 mcf
Lake Winnipesaukee (PR)	89	82	78	75	7,220 mcf
VERMONT					
Harriman (P)	81	71	71	70	5,060 mcf
Somerset (P)	81	74	71	76	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	85	81	77	78	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	81	67	67	71	34,270 mcf
Indian Lake (FMP)	97	98	97	72	4,500 mcf
New York City reservoir system (MW)	89	77	83	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	85	76	77	75	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	47	44	44	41	51,400 mcf
Pymatuning (FMR)	92	92	95	87	8,191 mcf
Raystown Lake (FR)	68	68	67	57	33,190 mcf
Lake Wallenpaupack (PR)	70	69	69	64	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	98	97	95	88	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	95	95	93	88	12,580 mcf
Narrows (Badin Lake) (P)	95	95	92	99	5,616 mcf
High Rock Lake (P)	91	80	79	74	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	90	85	83	71	70,300 mcf
Lakes Marion and Moultrie (P)	89	75	83	68	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	80	77	68	66	75,360 mcf
GEORGIA					
Burton (PR)	100	95	92	87	104,000 ac-ft
Sinclair (MPR)	91	94	81	86	214,000 ac-ft
Lake Sidney Lanier (FMPR)	67	67	60	56	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	99	94	92	85	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	73	60	48	46	1,156,000 cfsd
Douglas Lake (FPR)	90	68	43	46	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	90	80	88	68	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	88	75	51	53	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	95	83	63	68	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	86	77	100	76	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	80	66	93	64	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	40	34	40	35	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	93	93	95	95	22,700,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	91	106	96	77	127,600 ac-ft
Bell Fourche (I)	62	43	57	39	185,200 ac-ft
Lake Francis Case (FIP)	79	77	79	77	4,834,000 ac-ft
Lake Oahe (FIP)	97	95	94	.....	22,530,000 ac-ft

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of July 1979	End of Aug. 1979	End of Aug. 1978	Average for end of Aug.	Normal maximum
	Percent of normal maximum				
MIDCONTINENT REGION--Continued					
SOUTH DAKOTA--Continued					
Lake Sharpe (FIP)	101	103	99	99	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	90	99	93	96	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	73	69	59	67	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	101	97	85	80	2,378,000 ac-ft
Keystone (FPR)	103	98	82	89	661,000 ac-ft
Tenkiller Ferry (FPR)	105	105	96	90	628,200 ac-ft
Lake Altus (FIMR)	88	67	51	48	134,600 ac-ft
Lake O'The Cherokees (FPR)	95	80	85	83	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	101	100	92	92	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	51	50	46	46	386,400 ac-ft
Canyon (FMR)	96	92	107	70	385,600 ac-ft
International Amistad (FIMPW)	101	124	103	76	3,497,000 ac-ft
International Falcon (FIMPW)	100	97	64	64	2,668,000 ac-ft
Livingston (IMW)	100	100	83	80	1,788,000 ac-ft
Possum Kingdom (IMPRW)	95	97	97	100	569,400 ac-ft
Red Bluff (PI)	31	27	10	23	307,000 ac-ft
Toledo Bend (P)	94	92	84	83	4,472,000 ac-ft
Twin Buttes (FIM)	54	49	64	26	177,800 ac-ft
Lake Kemp (IMW)	58	58	55	84	268,000 ac-ft
Lake Meredith (FMW)	30	30	35	40	821,300 ac-ft
Lake Travis (FIMPRW)	94	94	72	74	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	100	97	99	94	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	91	95	96	105	5,022,000 ac-ft
Lake Chelan (PR)	100	94	96	94	676,100 ac-ft
Lake Cushman	103	98	101	96	359,500 ac-ft
Lake Merwin (P)	105	105	100	103	245,600 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	61	46	66	57	1,235,000 ac-ft
Coeur d'Alene Lake (P)	98	95	94	74	238,500 ac-ft
Pend Oreille Lake (FP)	98	100	100	100	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	65	49	72	55	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	77	79	95	86	802,000 ac-ft
Buffalo Bill (IP)	85	72	94	89	421,300 ac-ft
Keyhole (F)	84	81	84	46	190,400 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	68	60	56	47	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	2	2	0	17	364,400 ac-ft
Taylor Park (IR)	101	100	73	77	106,200 ac-ft
Colorado–Big Thompson project (I)	76	70	49	62	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	88	86	71	.....	31,620,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	72	70	68	62	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	86	79	83	66	1,000,000 ac-ft
Hetch Hetchy (MP)	97	84	97	68	360,400 ac-ft
Isabella (FIR)	61	43	72	29	570,000 ac-ft
Pine Flat (FI)	70	53	67	40	1,001,000 ac-ft
Clair Engle Lake (Lewiston) (P)	81	74	79	78	2,438,000 ac-ft
Lake Almanor (P)	76	69	94	55	1,036,000 ac-ft
Lake Berryessa (FIMW)	71	67	72	79	1,600,000 ac-ft
Millerton Lake (FI)	67	38	79	42	503,200 ac-ft
Shasta Lake (FIPR)	81	73	81	70	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	31	21	23	62	744,600 ac-ft
NEVADA					
Rye Patch (I)	66	61	32	57	194,300 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	85	85	79	71	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	89	83	10	12	1,073,000 ac-ft
Salt and Verde River system (IMPR)	88	82	76	38	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	50	51	27	81	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	36	36	6	24	2,539,000 ac-ft

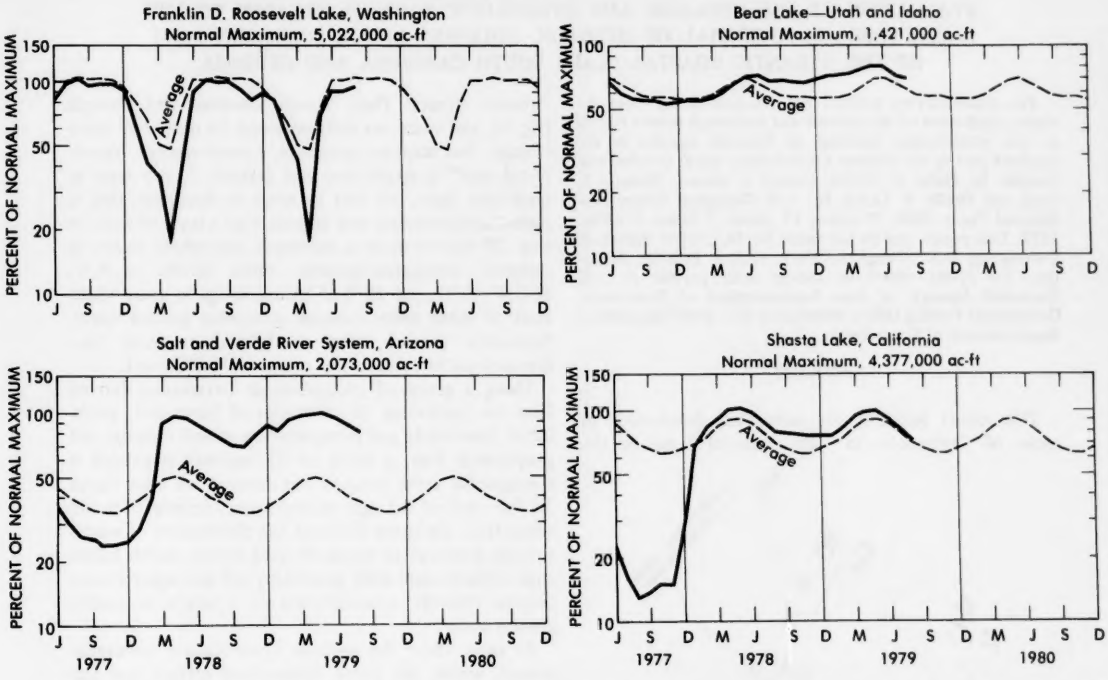
[a] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

FLOW OF LARGE RIVERS DURING AUGUST 1979

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1975 (cfs)	August 1979					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine	5,690	9,549	2,940	85	-38	5,800	3,750	31
1–3185	Hudson River at Hadley, N.Y	1,664	2,853	790	72	-1	1,400	900	31
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,630	1,529	107	+4	.....	.....	.....
1–4635	Delaware River at Trenton, N.J	6,780	11,630	4,520	106	-17	4,870	3,150	27
1–5705	Susquehanna River at Harrisburg, Pa	24,100	34,200	14,700	194	+40	14,400	9,310	27
1–6465	Potomac River near Washington, D.C	11,560	[1] 11,190	5,200	170	-6	4,000	2,600	31
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C	4,810	5,007	990	33	-53	900	580	31
2–1310	Pee Dee River at Peedee, S.C	8,830	9,657	4,690	77	-34	3,800	2,460	29
2–2260	Altamaha River at Doctortown, Ga	13,600	13,780	5,131	82	-23	5,700	3,700	31
2–3205	Suwannee River at Branford, Fla	7,880	6,970	6,090	113	+22	5,270	3,410	31
2–3580	Apalachicola River at Chattahoochee, Fla	17,200	22,330	12,400	87	-14	11,800	7,630	31
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	22,570	6,540	138	-64	9,700	6,270	30
2–4895	Pearl River near Bogalusa, La	6,630	9,263	5,142	186	-51	4,970	3,210	31
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 19,210	17,841	380	+208	15,800	10,200	26
3–0850	Monongahela River at Braddock, Pa	7,337	[1] 12,360	9,150	221	+65	10,200	6,590	26
3–1930	Kanawha River at Kanawha Falls, W.Va	8,367	12,530	7,608	181	-22	6,150	3,970	25
3–2345	Scioto River at Higby, Ohio	5,131	4,513	7,355	814	+235	15,600	10,100	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	114,100	115,400	386	+30	180,600	116,700	27
3–3775	Wabash River at Mount Carmel, Ill	28,635	27,030	75,660	886	+126	56,000	36,200	28
3–4690	French Broad River below Douglas Dam, Tenn	4,543	[1] 6,794	4,408	140	-50	.....	.....	.....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,185	2,310	106	0	.....	.....	.....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	241,100	274,500	109	-2	274,000	177,000	31
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,300	10,200	64	-21	16,600	10,700	31
5–0825	Red River of the North at Grand Forks, N. Dak	30,100	2,524	3,255	271	-40	2,500	1,620	31
5–1335	Rainy River at Manitou Rapids, Minn	19,400	12,950	8,300	76	-41	6,100	3,940	23
5–3300	Minnesota River near Jordan, Minn	16,200	3,412	12,780	697	+63	17,700	11,400	25
5–3310	Mississippi River at St. Paul, Minn	36,800	[1] 10,580	20,320	282	-10	24,700	16,000	26
5–3655	Chippewa River at Chippewa Falls, Wis	5,600	5,110	2,520	88	-41	.....	.....	.....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,613	7,360	149	+16	.....	.....	.....
5–4465	Rock River near Joslin, Ill	9,551	5,852	8,870	319	+87	7,000	4,500	31
5–4745	Mississippi River at Keokuk, Iowa	119,000	62,570	85,677	224	+6	118,000	76,300	31
6–2145	Yellowstone River at Billings, Mont	11,796	6,986	5,367	101	-55	5,450	3,520	31
6–9345	Missouri River at Hermann, Mo	524,200	79,750	70,020	126	-26	61,300	39,600	27
7–2890	Mississippi River at Vicksburg, Miss[4]	1,140,500	573,600	585,300	184	+10	388,000	251,000	31
7–3310	Washita River near Durwood, Okla	7,202	1,414	542	150	-23	500	320	31
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	724	960	323	-63	680	440	31
9–3150	Green River at Green River, Utah	40,600	6,366	3,057	100	-48	3,200	2,070	31
11–4255	Sacramento River at Verona, Calif	21,257	19,150	13,680	159	-4	11,500	7,430	28
13–2690	Snake River at Weiser, Idaho	69,200	18,170	10,860	101	+35	11,000	7,100	25
13–3170	Salmon River at White Bird, Idaho	13,550	11,290	4,186	77	-44	4,380	2,830	25
13–3425	Clearwater River at Spalding, Idaho	9,570	15,570	3,650	102	-57	5,120	3,310	25
14–1057	Columbia River at The Dalles, Oreg[5]	237,000	194,600	106,700	75	-42	.....	.....	.....
14–1910	Willamette River at Salem, Oreg	7,280	23,810	3,034	75	-24	6,780	4,380	27–31
15–5155	Tanana River at Nenana, Alaska	25,600	23,850	61,668	112	+2	49,500	32,000	31
8MF005	Fraser River at Hope, British Columbia	83,800	96,400	91,400	77	-47	82,100	53,100	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1977 TO AUGUST 1979



Contents of reservoirs in various parts of the West generally decreased in August but most were near or slightly above average. However, reservoir contents increased in a few places, including Franklin D. Roosevelt Lake, Washington. (See graph above.)

WATER RESOURCES REVIEW

August 1979

Based on reports from the Canadian and U.S. field offices; completed September 12, 1979

TECHNICAL STAFF
Allen Sinnott, Editor
Carroll W. Saboe, Associate Editor
Herman D. Brice
Ruth M. Kosco
Teri L. Leff
John C. Kammerer
Thomas H. Woodard

COPY PREPARATION
Lois C. Fleshmon
Sharon L. Peterson
Donna R. Johnson
Stephanie F. Michie

GRAPHICS
Frances B. Davison
Carolyn L. Moss
Leslie J. Robinson
Joan M. Rubin

EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for August based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for August 1979 is compared with flow for August in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for August is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the August flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of August. Water level in each key observation well is compared with average level for the end of August determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of July to the end of August.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

EVALUATION OF THE GEOLOGIC AND HYDROLOGIC FACTORS RELATED TO THE WASTE-STORAGE POTENTIAL OF MESOZOIC AQUIFERS IN THE SOUTHERN PART OF THE ATLANTIC COASTAL PLAIN, SOUTH CAROLINA AND GEORGIA

The accompanying abstract and illustrations are from the report, *Evaluation of the geologic and hydrologic factors related to the waste-storage potential of Mesozoic aquifers in the southern part of the Atlantic Coastal Plain, South Carolina and Georgia,* by Philip M. Brown, Donald L. Brown, Marjorie S. Reid, and Orville B. Lloyd, Jr.: U.S. Geological Survey Professional Paper 1088, 37 pages, 11 plates, 1 figure, 8 tables, 1979. This report may be purchased for $4.75 from Branch of Distribution, U.S. Geological Survey, 1200 S. Eads St., Arlington, VA 22202 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington D.C. 20402 (payable to Superintendent of Documents).

ABSTRACT

This report describes the subsurface distribution of rocks of Cretaceous to Late Jurassic(?) age in the Atlantic Coastal Plain, South Carolina, and Georgia (fig. 1), and examines their potential for deep-well waste storage. For mapping purposes, a waste-storage "operational unit" is established and defined. It is a sand or sandstone layer, 20 feet or more in thickness, that is immediately overlain and underlain by a layer of shale or clay, 20 feet or more in thickness, and which occurs in regional chronostratigraphic units (Units A, B, C, D, E, F, G(?), and H(?) of Mesozoic age in areas where each of these units contains nonusable ground water. Nonusable ground water is defined as water that contains sodium chloride in excess of 10,000 mg/L.

Using a group of geohydrologic parameters derived from or combining 21 categories of basic data, established from study and interpretation of well cuttings and geophysical logs, a series of 32 regional maps and 8 stratigraphic cross sections was constructed. (See figure 2.) For each of the eight geologic units delineated in the subsurface, the maps illustrate the distribution of waste-storage potential in terms of areal extent, depth below land surface, sand-shale geometry, and the approximate sodium chloride concentration of a unit's nonusable ground water.

In areas where the geologic units contain nonusable ground water, the depth below land surface and the thickness of potential waste-storage reservoir and reservoir-seal combinations are variable. The range in variability appears to be broad enough to meet the need for a wide choice among the geologic requirements that would normally be considered in selecting specific waste-storage sites for detailed examination.

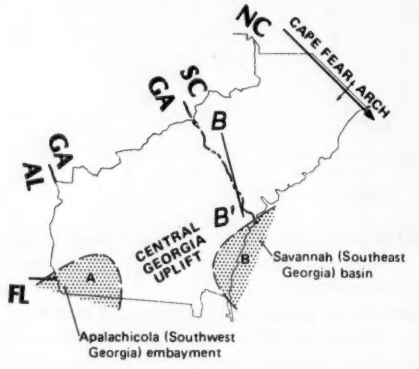


Figure 1.—The location of principal structural features in the project area, and location of the cross section *B-B'* shown in figure 2 below.

* * *

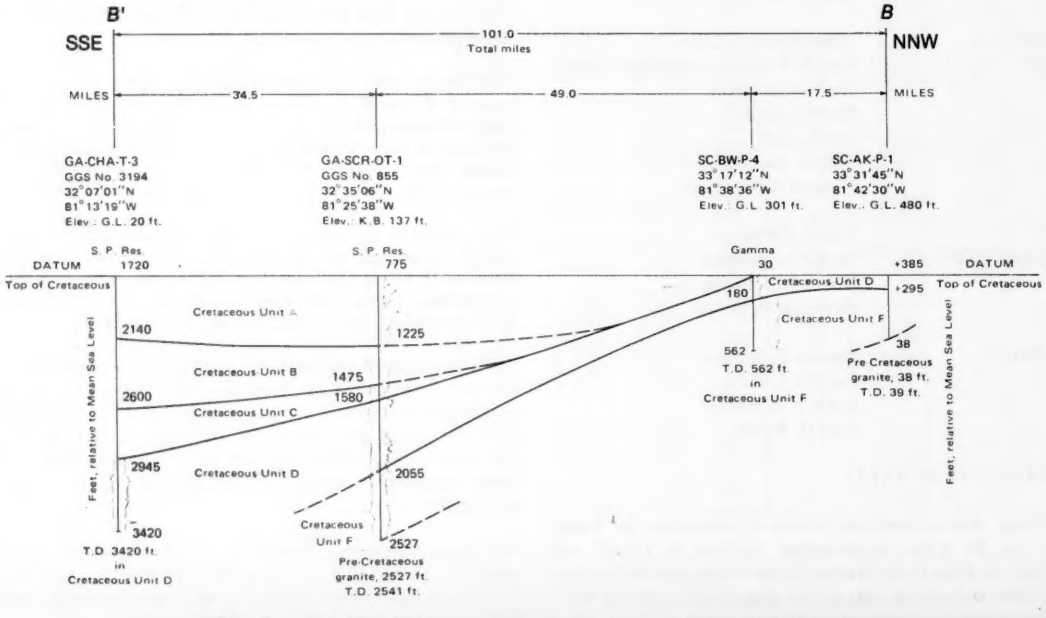


Figure 2.—One of the eight representative stratigraphic cross sections in the report.